193 N. Walker

The Pan-Pacific Entomologist

Vol. VIII, No. 2 October, 1931

ON THE DIGGER WASP, PODALONIA LUCTUOSA (F. SMITH)

BY CHARLES H. HICKS
Los Angeles, California

Newcomer [1] has recently published an excellent paper on the life history, habits and inquilines of the digger wasp, *P. luctuosa* (F. Smith). Hicks [2] has later verified these observations and considered certain other facts. From a study of the species extending over a period of more than seven years, still other points press for consideration. One has to do with the adult female prior to and including the period of active nesting. It is one that is linked with the manner in which the wasp may hibernate and closely associated with her nesting activities.

This wasp, very early in the spring or late winter (she may nest as early as December in southern California), begins her hunt and capture of subterranean larvæ. These are large, mature, or nearly mature cutworms, which she digs from the soil and paralyzes with her sting. The prey, reduced to a comatose condition, is suspended over a stem or low object while the wasp hunts for a nest site and digs in the soil a short tunnel with a cell at the end. The victim is then transported into the cell, an egg is placed on its side, the tunnel is closed and the wasp is soon ready to capture another. There is apparently never more than one larva and one egg to a given nest, although the wasp is an industrious worker and provisions many cells.

Fernald [3] points out that this is a northern species with southern extensions in mountainous districts. It is also active very early in the season, being present, as for example, at Boulder, Colorado, when few other insects are abroad. It is found along with the bees of the genus *Halictus*, known in

1 Newcomer, E. J. Notes on the Habits of a Digger Wasp and Its Inquiline Flies. Ann. Ent. Soc. Amer., 23:552-563, 1930.
2 Hicks, Charles H. The Hunt and Capture of the Prey of a Digger Wasp. Bull. So. Calif. Acad. Sci. (In press.)
3 Fernald, H. T. The Digger Wasps of North America of the Genus Podalonia (Psammophila). Proc. U. S. Natl. Mus., Vol. 71, pp. 1-42, 1927.

several species to hibernate during the winter as adults, and reasoned to do so in many more, upon the first flowers of the year. It is from this and other facts that the female *P. luctuosa* is suspected of hibernating in the adult stage. A review of certain facts pointing to this habit will be given below.

In the fall of 1926 at Boulder, when the view of the sun had suddenly become dimmed by a passing cloud, a wasp under observation soon made her way to an open tunnel at the edge of a mound of sand. Reaching the entrance, she moved within. The mound was then dug away, exposing the tunnel. This tunnel was found to be almost vertical in position, with a nearly even diameter of 9 mm. and a total length of 170 mm. At the bottom was the wasp I had been observing and three more females resting together.

This observation was made at Owens Lake on September 15. During the active nesting season no such gregarious instinct was evidenced; not, at least, in nest building or provisioning, for the females were then very solitary in habit. In the words of Newcomer[4]: "The *Podalonias* are distinctly solitary and have no love for one another."

The tunnel, in contrast to those constructed for prey which seldom measure more than three inches and usually less, was more than seven in length and more vertical in position. It appeared that it had been especially constructed or appropriated for winter quarters.

Eleven days later, this time at the historic White Rocks, another female was followed into a long tunnel. This one was nearly ten inches deep and of about the same diameter as the first. The walls of the tunnel of each retreat were smooth and in general structure similar. The wasp had advanced to the very end.

That these females were not decrepit nor near the end of their days was evidenced by the fact that they lived for many weeks in improvised cages placed in the University greenhouse. In this altered environment the individuals were subjected to a much higher air temperature and humidity than they would have been in the open. Thus they doubtless "burned out" their lives much earlier than they normally would have done.

[4] Newcomer, E. J. Ann. Ent. Soc. Am., 23:557, 1930.

Subsequently, two years later in California, females were observed during the winter, previous to Christmas. The weather was quite cold near Burbank. There had been heavy frosts and a slight freezing of the soil on a number of nights. On December 28, *P. luctuosa* was already found with captured prey. She had apparently come to take it to a prepared nest and had been disturbed by my arrival. But she immediately resumed her work—a typical provisioning.

The task finished, the wasp was watched further to see if she had a retreat. The weather at the time, although already high noon, was becoming more chilly, a condition to which the insect appeared to respond. She did this by becoming less active and by resting more often than usual flat against the earth. She soon, however, made her way in an erratic manner, some fifteen feet distant to the edge of a plowed area, suddenly disappearing in a tunnel. The tunnel measured about 9 mm. in diameter and extended 97 mm. into the earth.

This place of refuge was the more interesting because of the fact that the soil in which it had been dug had been plowed not later than a month before. Since few wasps other than this species were about at this time, it seems highly probable that she had constructed it. But it throws no light on the question as to whether or not she hibernated in the adult stage during the winter. Much evidence points to the fact that she does, but it has not been proven.

Other examples secured from studies at or near Pasadena might be presented. It suffices to say, however, that these agree essentially with the known facts.

It is obvious from a knowledge of its habits that this species is of distinct economic aid in the destruction of cutworms, an aid which can doubtless be greatly augmented under artificial conditions. The fact that the wasp may remain alive in captivity for weeks at a time and its habit of remaining comparatively quiet for periods, if not actually hibernating in the adult stage, adds to this possibility. Thus it would appear possible to rear it in the laboratory or to collect the wasps in the fields in large numbers, transport them to threatened areas and relieve cutworm devastation.

TWO NEW SPECIES OF SARCOPHAGINÆ FROM CALIFORNIA

BY DAVID G. HALL

Division of Insects Affecting Man and Animals
Bureau of Entomology

A large number of Sarcophagidæ were taken in California during the summer of 1929 by the annual collecting expedition sent out by the Department of Entomology, Kansas University. Among these were the following two undescribed species.

Sarcophaga beameri Hall, n. sp.

Male. Front 0.279 of head width, average of three specimens (0.273, 0.300, 0.266); parafrontals and parafacials silvery gray pollinose, the former with the usual row of minute hair below, near the eye; frontal bristles about nine, diverging below to about the middle of the second antennal joint; antennæ black, third joint two and a half times the length of the second, reaching about three-fourths the distance to the vibrissæ, which are normal and at the oral margin; palpi and proboscis black, ordinary; bucca two-fifths the eye height and covered with black hair, none pale before the metacephalic suture; back of head with three rows of postocular cilia, pale hairs around the middle and below.

Thorax gray pollinose and with the usual three to five black stripes; prescutellars, one pair; anterior dorsocentrals, three; posterior dorsocentrals four; sternopleurals three; scutellum with three marginals, one subapical and one apical.

Abdomen tessellated and with the usual three shifting black stripes; first, second, and third abdominal segments with lateral bristles only; fourth segment with the hind border distinctly reddish, and with a marginal row of about twelve bristles. Fifth sternite divided, reddish, the two arms parallel and together, covered with minute setæ.

Hypopygium red; first segment somewhat dark basally, slightly pollinose and with a marginal row of about seven setæ; second segment with numerous bristle-like hairs; genital parts as shown in the figure.

Wings hyaline; costal spine small; fifth costal segment a trifle shorter than the third; first vein bare, third hairy about two-thirds the distance to the cross vein.

Legs black; middle femur with comb; middle tibia with one long and one short anterodorsal bristle; hind tibia with long but sparse villosity.

Female: Unknown.

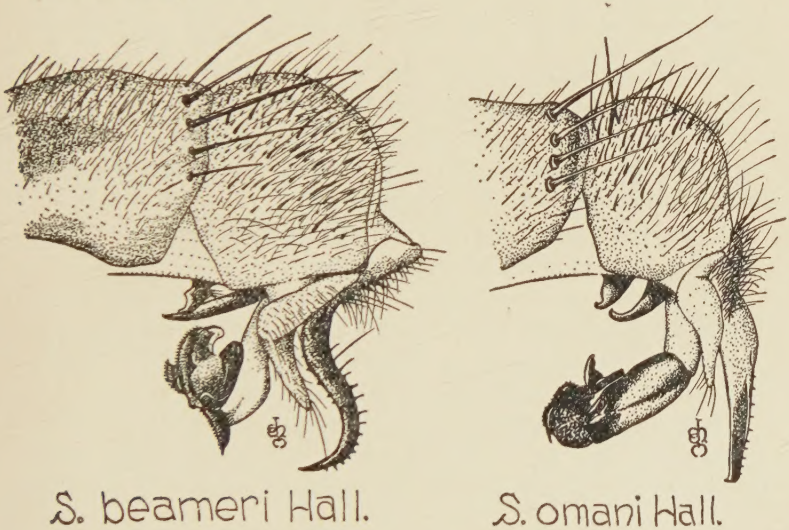
This species belongs to the provisional group "F," and is seemingly most closely related to those species near *S. prohibita*

Ald., from the shape of the genitalia. It differs from any of these, however, in possessing four posterior dorsocentrals; all the others, with the exception of *S. hamata* Ald., have three. It differs from this latter species in having the posterior pair of tibiæ villose, as well as possessing numerous differences in the form of genitalic parts.

Holotype: Kansas University collections.

Paratype: No. 43,810, U. S. National Museum.

The above description is based upon three male specimens; the holotype, collected at Cuyamaca Lake, California, July 6, 1929; one paratype, collected in the Laguna Mountains, California, July 6, 1929 (R. H. Beamer); the other, in the San Jacinto Mountains, Riverside County, California, July 28, 1930 (D. G. Hall).



Sarcophaga omani Hall, n. sp.

Male. Front 0.189 of head width, average of five specimens (0.175, 0.235, 0.177, 0.150, 0.212); parafrontals and parafacials silvery gray pollinose, the former with a single row of quite long bristles below near the eye; frontals about eleven, diverging below to about the middle of the second antennal joint; antennæ black, third joint twice the length of the second and reaching three-fourths the distance to the vibrissæ, which are slightly approximated and a bit above the oral margin; arista with long plumosity for almost three-fifths its length; palpi longer than usual; proboscis shorter; both black; bucca

about one-third the eye height and covered with black hair, none pale before the metacephalic suture; back of head with two rows of postocular cilia and pale hair around the middle and below.

Thorax gray pollinose and with the usual three to five black stripes; anterior acrostichals two or three; prescutellars, one pair rather large; anterior dorsocentrals two; posterior dorsocentrals three; sternopleurals three; scutellum with two marginals, one subapical and one apical.

Abdomen silvery gray pollinose, tessellated, and with the usual three shifting black stripes; first and second segments with lateral bristles only; third segment with a small pair of depressed marginals; fourth segment with a marginal row of about ten bristles. Fifth sternite obscured.

Hypopygium red, shining; first segment with a marginal row of about eight long setæ; second segment covered with numerous bristle-like hairs; genital parts as figured.

Wings hyaline; costal spine developed but not long; third costal segment as long as fifth; first vein bare; third vein with setæ almost to the cross vein.

Legs black; middle femur with comb; middle tibia with one anterodorsal bristle; hind tibia without villosity.

This species belongs to the provisional group "D" and is related to those species nearest *S. aculeata* Ald., from which it differs in the shape of the genital parts.

Holotype: No. 43,811, U. S. National Museum.

Paratype: Kansas University collections.

The above description is based upon a male specimen selected from a series of ten males: three, Deer Creek Canyon, Peloncillo Mountains, New Mexico; four, Menard, Texas, August (H. E. Parish) from traps baited with decaying meat; one from the Laguna Mountains, California, July 6, 1929 (L. D. Anderson); and two from Coachella, California, July, 1929 (Hall). The holotype is from the Arizona series.

GELECHIA VERSUTELLA Zell.

Previous publications on this species have listed it from Canada, Wyoming, Colorado, and Texas, but not from California. It is, however, fairly abundant on the wing in northern California during the latter part of June, and may then be taken flying from the trunks of Cottonwood trees. The specimens before me were collected a few miles above Sacramento on the Sacramento River. Mr. Busck determined the species.—H. H. Keifer.

NOTES AND DESCRIPTIONS, AMERICAN NOTODONTIDÆ

BY FOSTER H. BENJAMIN

Bureau of Entomology, United States Department of Agriculture

The notes and descriptions in this paper are the result of rearrangement of certain groups in the National collection. One genus and seven species of American moths are described as new and the synonymy of four other species is discussed.

Ianassa pinalensis Benjamin, n. sp.

Head and thorax clothed with white and black scales. Fore wing blackish, basally tinged with rufous, suffused with white in region of cell and submedian fold, with a white patch distal to the dark discocellular patch; veins marked with black; black basal dash present; a black subterminal series of dashes between the veins, these dashes more or less defined by white, the dash above tornus being the heaviest; fringe dusky with paler interline, partly tipped with white. Hind wing hyaline white with some black scales on anal angle and tinging veins 2, 3, and 4; fringe pale, tinged with some few fuscous scales, except toward anal angle where the fuscous is intensified. Beneath white, tinged with black especially along the veins, the costal and distal regions of the fore wing, and the costal region and anal angle of the hind wing.

Expanse: 37 mm.

Holotype. Cat. No. 43,677, U. S. N. M.

One ♂, Pinal Mountains, Arizona, elevation 5,000 feet, 15-22 May, 1925 (O. C. Poling).

Ianassa delicatoides Benjamin, n. sp.

Head and thorax dull black and white mixed. Fore wing dull black, marked with black and white; basal dash, veins, discal dot, diffused median shade, subterminal dashes strongest above tornus, all black; t. p. line black, irregular, dentate, geminate, filled with whitish scales; subterminal dashes more or less defined by white; fringe fuscous, with paler interline. Hind wing hyaline white, veins more or less tinted with fuscous, which shade is more or less emphasized along costa and at anal angle. Beneath: fore wing whitish powdered with fuscous; hind wing much as on upper side.

Expanse: 46 mm.

Holotype. Cat. No. 43,677, U. S. N. M.

One ♂, Santa Catalina Mountains, Arizona, September.

Ianassa alpica Benjamin, n. sp.

Head and thorax powdered with black scales and suffused with pale violaceous and white. Fore wing ochraceous powdered with

black scales above submedian fold, suffused with violaceous white throughout the same region, the white emphasized as surrounding the discal black dot, at apex, along vein 5, and as a streak interrupting the obsolescent t. p. line between veins 5 and 6; median shade dull fuscous, poorly defined; t. p. line poorly defined except in the region of the tornus where it is irregular, oblique, geminate; basal black dash present; a black patch at tornus interrupted by a subterminal white crescent; the ordinary black s. t. streaks poorly indicated; fringe ochreous, interlined paler, checkered by black at the tips of the veins. Hind wing hyaline white with a slight powdering of black along costal region and at anal angle; fringe nearly pure white, faintly luteous basally. Beneath: fore wing white, powdered with black, especially along costal and outer margins; hind wing much as on upper side; fringes of all wings much as on upper side.

Expanse: 40-42 mm.

Holotype ♂, 4 ♂ *paratypes,* 1-7 April, 1-7 June, 8-14 September, all 1926, Alpine, Texas (O. C. Poling), Cat. No. 43,683, U. S. N. M.

Schizura paradisus Benjamin, n. sp.

Head and thorax dull black and white mixed. Fore wing dull black marked with black, luteous, and white; basal dash, veins, discal dot, obsolescent median shade, subterminal dashes strongest above tornus, all black; t. p. line black, irregular, dentate, geminate, obsolescent above vein 4, filled with whitish scales; subterminal dashes more or less defined by whitish; a small luteous, white patch near apex; a large luteous, white terminal patch between veins 2 and 4; fringe luteous, underlined paler, interrupted by black scales, especially at tips of veins and at tornus. Hind wing hyaline white, the veins more or less tinged with a few fuscous scales, especially terminally; powdered with fuscous along costal region and with a strong fuscous patch at anal angle; fringe white, defined basally with pale luteous, with black at anal angle and a few black scales at the tips of veins 2 and 3. Beneath: fore wing white, more or less powdered with black scales which are emphasized along the costal region; hind wing much as on upper side.

Expanse: 43 mm.

Holotype. Cat. No. 43,684, U. S. N. M.

One ♂, Paradise, Cochise County, Arizona.

Litodonta (?) alpina Benjamin, n. sp.

The present species does not fully agree with the genotype of *Litodonta,* veins 7, 8, and 9 being stalked and 10 shortly stalked from the accessory cell of fore wing, the antennæ with long pectinations decreasing toward the tip, the last six joints not pectinated.

Fore wing dull fuscous brown, irrorated with black and violaceous-white scales; basal line black, from costa to vein 1, distally defined by violaceous-white; s. t. and t. p. lines obsolescent, irregular but nearly erect, indicated by a series of powdery black scales; reniform thin, bar-like, erect, black; a diffused subterminal fuscous shade line appearing as if composed of obscure sagittate black dashes distally fused; terminal line black, thin; veins more or less marked by either black scales or violaceous-white scales; fringe dull ochreous faintly interlined and checkered by black. Hind wing dull fuscous-brown, paler basally, tending to have a deeper fuscous-brown terminal line; fringe fuscous-brown checkered with blackish. Beneath: dull sordid white powdered with fuscous, especially upon costal and outer areas of fore wings and along the outer margins of the hind wings; fringes checkered.

Expanse: 42 mm.

Holotype, 2 ♂ *paratypes.* Cat. No. 43,814, U. S. N. M. Three ♂ ♂, Alpine, Texas, 1-7 July, 1-7 August, 22-31 August, 1926 (O. C. Poling).

Præschausia Benjamin, n. g.

Type: *Kalkoma zapata* Schaus.

Male antennæ pectinate to tips, female antennæ simple, scarcely ciliated. Palpi very short, upcurved, the third joint short and scarcely visible. Tongue extremely short. Legs hairy, except the tarsi. Eyes large and rounded. Frons less than half the width of the eye, with central scale tuft. Mesothorax with strong patches of broad metallic scales appearing as tufts. Abdomen with slight tuft at base (this tuft often lost). Fore wing: vein 2 from two-thirds out on discal cell; 3 and 4 from near lower angle; 5 from above middle of discocellulars; 6 from accessory cell near discal cell; 7 from near tip of accessory cell; 8 and 9 stalked from tip of accessory cell; 10 from near tip of accessory cell; 11 from about two-thirds out on discal cell; accessory cell extremely long and narrow, about the length of vein 7 and longer than 8, 9, or 10. Hind wing: vein 2 from about two-thirds out on cell; 3 and 4 from near lower angle; 5 from near middle of discocellulars; 6 and 7 stalked from upper angle; 8 parallel with cell to near its end, thence sharply divergent.

Named in honor of Dr. William Schaus.

PRÆSCHAUSIA ZAPATA Schs.

A pair of this species are in the Barnes series from Baboquivari Mountains, Pima County, Arizona, 1-15 August and 15-30 September, 1924 (O. C. Poling). The type locality is Presidio River, Sinaloa, Mexico.

HETEROCAMPA BELFRAGEI Grt.

A single male specimen is in the National collection and agrees with a figure received with the Barnes collection, of the type male in the British Museum. This is not the same as the male of *masta* Schs. (see B. and Benj., 1924, Contrib. N. H. Lep. N. Am., V, (3), 180).

The correct synonymy for the latter species appears to be *edwardsi* Druce ‡ *mucosa* Hy. Edw. nec Moschl. = *masta* Schs. Types of *muscosa* Hy. Edw. and *masta* Schs. are in the National Museum, while the name *edwardsi* was proposed by Druce as a straight nom. nov. to rectify a homonym, hence has as type the type of *muscosa*.

HETEROCAMPA PICTA Feld.

= *astarte* Dbldy. = *menas* Harris = *chapmani* Grt.

Form PEROLIVATA Pack.

The name *picta* Felder was applied to a female specimen said to come from the Amazon. No closely related South American species is known and the name has been generally included in North American lists. Four similar species are known from the United States, of which *simulans* B. and Benj. from Iowa and *rufinans* Dyar from Colorado may be omitted from discussion. Of the other two the name *picta* was applied to a Florida species in the National collection, while the name *astarte* was applied to a Texas species. The Barnes collection had these names reversed, so that *picta* was applied to the Texas, and *astarte* to the Florida species.

Figures of types *astarte* and *chapmani* are before the author and represent, respectively, male and female of the Florida species; the name *menas* is simply another name for *astarte,* and Felder's figure, although rather poor, seems to represent a female specimen of the same species. Packard's type of *perolivata* is a runty bred male from Fort Monroe, Virginia, with whiter hind legs and more olivaceous fore wings than typical *picta*. Possibly the name may represent a lower austral race of *picta* rather than a mere color form.

To the *"astarte"* of the National Museum, Brooklyn Institute, and Cambridge collections, and the *"picta"* of the Barnes collection, the following name is applied.

Heterocampa astartoides Benjamin, n. sp.

Male. Head and thorax pale olive green powdered with black, often appearing grayish. Fore wing with ground color olive green powdered with black; basal half-line black, interrupted at the black basal dash, other obscure basal lines present; t. a. line black, geminate, nearly erect; reniform an elongate, thin black crescent powdered and crossed by median obscure black shades; t. p. line black, geminate, dentate, outwardly oblique at costa, slightly incurved near cell, thence obliquely incurved to the inner margin; s. t. line mainly as a strong dark shade, heaviest opposite a whitish subapical patch between said line and the t. p.; terminal line thin, irregular, black. Hind wing nearly pure hyaline white with some black scales along costa and a black dot at anal angle. Beneath: white with black powdering, especially along the costa and terminally on the fore wing, and along costa of the hind wing which possesses the black dot in the anal angle as on upper side.

Female similar to the male, except tending to have the fore wings more olivaceous; the hind wings with their veins and distal margins suffused with fuscous, and with more or less obsolescent fuscous median shades.

Holotype ♂, *allotype* ♀, 9 ♂, 13 ♀ *paratypes*. Cat. No. 43,815, U. S. N. M. Ten ♂♂, 14 ♀♀, the holotype from Shovel Mountain, VII, 12, the allotype from the same locality; paratypes from San Antonio, Shovel Mountain, Kerrville, and unknown Texas localities.

Note: The male genitalia of *astartoides* and *picta* differ mainly in the shape and dentation of the socii. The author would be inclined to consider that only geographical races were involved were it not for the fact that the t. a. line is nearly erect in *astartoides* and decidedly oblique in *picta*.

HETEROCAMPA OBLIQUA Pack.

A specimen compared by the author with types *trouveloti* Pack. (at Cambridge) and *brunnea* G. & R. (Amer. Mus.) indicate that these names apply to the normal females of the same species described as *obliqua* Pack., the type of the last mentioned also having been compared by the author (at Cambridge).

The name *varia* Wlk., of which there is a specimen in the Barnes material, compared with the Walker type and labeled "exact J. McD.," takes priority over the names *georgiana* Dyar and *baryspus* Dyar (types in U. S. N. M.).

Heterocampa secessionis Benjamin, n. sp.

Superficially similar to *obliqua* in size and markings; the fore wings darker, lacking luteous shadings; the hind wings of the males lacking fuscous shading along the inner margins.

The genitalia of *secessionis* and *obliqua* are different. In the former, as contrasted with the latter, the ædœagus is smaller, its armature reduced to about one-third; the socii are smaller, less evenly curved, and with different dentation.

Holotype ♂, *allotype* ♀, 8 ♂, 4 ♀ *paratypes*. Cat. No. 43,816, U. S. N. M., Alpine, Big Bend, Texas, various dates, June to September.

A Defoliating Noctuid

The ash (*Fraxinus oregona*) over large areas in Douglas County, Oregon, was almost completely defoliated in early May, 1931, and the caterpillars of the second brood were abundant the second week of July. The caterpillars eat the more tender part of the leaves, leaving the mid-ribs and the lateral veins. When full grown they descend to the ground and pupate under the soil.

The moths were identified by Mr. F. H. Benjamin as *Homohadena fortis picina* Grote. There seems to be no record in economic literature mentioning this species.—W. J. Chamberlin, Forest Entomologist, Oregon State College.

Diploiulus Luscus (Meinert) in California

Professor R. V. Chamberlin places this name on certain small Millipeds which were collected in Sacramento early in November 1931. This Arthropod is very common around Capitol Park, and elsewhere in the city. Professor Chamberlin writes that this species is a native of Europe which is common in cultivated areas, but is uncommon, even in Europe, where the soil is not cultivated. Its economic status is in doubt, but it has been observed entering houses in large numbers. On several occasions, during sunny winter days, thousands of individuals have crawled up on the warm sides of the Capitol buildings.—H. H. Keifer, Sacramento.

CALIFORNIA MICROLEPIDOPTERA V

(Gelechiidæ)

BY H. H. KEIFER

California Department of Agriculture
Sacramento, California

Since publishing the last installment of this series (No. IV, Pan-Pacific Entomologist, Vol. 7, p. 27, 1930), the ranges of the two Gelechias described have been extended. Adults of *Gelechia manzanitæ* Keifer were taken at light at Zephyr Point, Lake Tahoe, Nevada, September 1, 1930. Adults of *Gelechia arbutina* Keifer were taken at light, September 5, 1931, at Mount Hermon, Santa Cruz County, California. I am now fairly certain that *manzanitæ* overwinters in the larval stage. As was stated in Article No. IV, the larvæ of this species are to be found on overwintering leaves before the spring growth has started. The finding of small caterpillars between closely tied Manzanita leaves at an elevation of about 4000 feet, Placer County, February 22, 1931, which are undoubtedly referable to this species, strengthens this assumption. I also have recently noted similar small larvæ wandering from dry Manzanita leaves taken near this Placer County location, August 23, 1931. *Gelechia arbutina* bears the same relation to Madrone. The fundamental difference in the life history of *Gelechia panella* Busck is that the adult hibernates. An adult of *panella* was flushed from a dead pine stump last February at an altitude of about 1000 feet in El Dorado County, California.

The species described as *Epithectis californica* in the above mentioned installment is properly referred to Meyrick's genus *Leucogonia*. This species is very closely related to *subsimella* Clem., and probably can only be differentiated by means of the male genitalia.

Eucordylea mackiei Keifer, n. sp.

The adult is a small gray moth with slight black tufts of scales on the forewings and a central longitudinal black streak on the outer two-thirds of these wings, which streak separates the whiter anterior half from the darker posterior. The caterpillar mines in Manzanita berries and is brick red in coloration.

Alar expanse 9-11 mm. Fore wings white, overlaid somewhat unevenly with fuscous irroration, costal half slightly lighter. A black

dot just within base on the fold. An oblique dark fuscous, rather indistinct, band from costal base, ending in fold and followed by white in the fold (internal edging of plical stigma). An elongate black spot within costa at one-fourth, in a rather large whitish area. A very short blackish outwardly oblique dash on costa just before one-half, opposite which the plical stigma, a small black tuft, is preceded and followed by white. Between these the first discal stigma, a black scale tuft, is narrowly circled by white. A blackish central longitudinal streak begins just before first discal, is partially interrupted by the lower half of this stigma, is again interrupted at the apical third by the lower half of the second discal stigma, and ends well within the apex. The second discal stigma is a small black tuft circled by white and connected by a short transverse white line to another small black tuft within tornus. A faint thin white fascia sometimes present within apex from beginning of costal cilia, running obliquely outward to end of central longitudinal black streak, thence back to tornus. Blackish blotches often distinguishable on basal side at ends of fascia, especially on costa. A row of black spots around apex of wing on margin, more or less edged with white inwardly. Cilia fuscous white, irrorated fuscous on costa and around apex (no irroration on tornal cilia), with a fuscous line running around apex in cilia. Hind wing and cilia creamy white, slightly overlaid with fuscous, males with a light ochreous thin hairpencil from dorsal base. Antennæ with basal joint fuscous; flagellum of female slender, alternating whitish and fuscous annuli on basal half, fuscous apically; male antennæ all fuscous and thick. Palpi white, second joint with dark fuscous base and central and ante-apical broad dark fuscous annuli, confluent above, incomplete on inner side; tip of joint narrowly white, tuft of male creamy white, slightly fuscous apically; a slight fuscous coloring at base of terminal joint, a fuscous annulus just below middle and a broad fuscous annulus just below tip. Head creamy white irrorated with fuscous above. Thorax white, more or less infused or irrorated fuscous, in some specimens with four black spots, two just behind head and two, slightly tufted, before apex of thorax; patagia as thorax or lighter. Abdomen whitish, slightly fuscous, more fuscous laterally. Male genitalia (Figure 1) asymmetrical; tegumen nearly symmetrical; no lateral projections; uncus broad; right harpe long and slender, inclined to the left from base and strongly recurved to the right distally (as in Recurvaria); left harpe nearly straight, slender, shorter than right harpe; vinculum asymmetrical and holding the anellus on right side; ædœagus a slightly tapering tube somewhat ventrally curved. Female genitalia as in Figure 2.

Holotype, male, No. 3588, Museum California Academy of Sciences, reared June 16, 1930, from a larva mining in the pulp of a Manzanita berry (Arctostaphylos sp.) which I col-

lected May 30, 1930, about three miles northwest of Pentz, Butte County, California (Clear Creek). Allotype, female, No. 3589, Museum California Academy of Sciences, with the same data as the holotype except that the larva was taken June 2, 1928, and the adult emerged June 13, 1928. Fifty-six paratypes are in the series from the same locality, the larvæ collected June 2 and 6, 1928, and May 30, 1930; adults emerging approximately from June 6 to June 28. Paratypes are distributed to the United States National Museum and to Miss Annette F. Braun. I take pleasure in naming this species for D. B. Mackie, senior entomologist, California Department of Agriculture, who noted these larvæ in Manzanita berries while investigating for possible native hosts of the Mediterranean fruit fly.

Besides the type locality there are a number of specimens from other California localities: Marysville Buttes, Sutter County (Keifer, collector); Crescent Mills and Mohawk, Plumas County (M. L. Jones of the State Department of Agriculture, collector); Clarksville, El Dorado County (Keifer); Tuolumne County (A. C. Browne of the State Department, collector); Towle and Cisco districts, Placer County (Keifer); Zephyr Point, Lake Tahoe, Nevada (Keifer); Emerald Bay, Lake Tahoe, California (Eleanor Fourness, State Department, collector). Several species of *Arctostaphylos* are infested in this range, which includes elevations from 500 to 7000 feet.

Below an elevation of approximately 4000 feet larvæ are to be found in Manzanita berries through May and June. Above this elevation the species of Manzanita fruit much later in the season and larvæ can there be collected from late July to early October. Very likely there are gradations between the times mentioned, but with the possible exception of the Plumas County specimens they have not been observed; they do not occur in contiguous areas. Adults from the higher elevations tend to be markedly larger (up to 13 mm. expanse) and darker than the lower forms, but have the same color pattern and genitalic characters. The fall larvæ produce adults in the laboratory during September, October, and even as late as December.

Larva: 5-7 mm. long when full grown. Body rather light ochreous or light brown-ochreous, with a slight whitish cast except where overlaid with brick red. This red color on all body segments except

first thoracic; dorsal half of all segments with more red on the anterior two-thirds; second thoracic whitish on anterior margin; each segment increasingly overlaid with red; fifth, sixth, and seventh abdominals with only whitish dorsal spots (which include seta II) and a lateral spot; segments eight, nine, and ten all red. Ventral surface generally flecked with red. Tubercles small, slightly fuscous, hairs moderately long, whitish. Crochets 22 to 24, unevenly biordinal, weak outwardly. Thoracic shield ochreous brown, spotted or slightly overlaid with fuscous. Anal shield as thoracic shield. Head clear ochreous; intraocellar area fuscous. Pupa: 4-4.5 mm. long, brown, glabrous, rather slender. Maxillæ ending at convergence of the antennæ and separating the mesothoracic legs. Wings, antennæ and hind legs ending just within posterior margin of fifth abdominal segment. Sixth and seventh abdominal segments with anterior suture of each flexible. No cremaster at tip of abdomen; hooked hairs present.

The larval habit of *Eucordylea mackiei* is purely that of mining through the pulp of the Manzanita berry. A surface discoloration may usually be noted, and often the gallery which was made by the newly hatched larva is visible just under the surface. The larval coloration is much the same as that of many Manzanita insects and approximates the color of the limbs. Apparently the female of the lower altitude form overwinters, as the egg must be deposited on the berry. In high altitudes it is probable that at least part of the individuals hibernate in the pupal stage.

Besides this new species, *Eucordylea* contains three other species, all North American. I have not surely seen any of these, but by their descriptions offer the following comparative notes. *E. atropictella* Dietz is eastern and differs notably by the presence of a heavy oblique blackish band from about the middle of the costa to the fold. *E. elucidella* Barnes and Busck is a southern California species, but lacks the black central longitudinal streak on the fore wing. *E. gallicola* Busck is very similar to the new species, but has palpi which are possibly colored differently and breeds in sawfly galls on willow; it was described from Colorado. The symmetrical tegumen of the male genitalia of *mackiei* is a specific character, as a male which is probably *gallicola;* has a large projection from the right side of this structure.

Exoteleia burkei Keifer, n. sp.

The larva of this moth bores out a central longitudinal gallery in developing buds of Monterey Pine in the early spring, causing the young shoot to droop and die. The adult is a small dark grayish brown moth, with three whitish transverse fasciæ, edged by black tufts, and bright orange coloring between these fasciæ.

Alar expanse 8-10.5 mm. Fore wings shining, ochreous brown; outlined, usually narrowly, by whitish scales bearing a broad ante-apical fuscous or blackish fuscous shade and tipped white; these scales usually covering most of area below fold. Usually a small blackish or dark fuscous scale tuft within central base. White transverse fasciæ at one-fourth, one-half, and three-fourths, respectively, the central widest. First fascia from costa ending on dorsum, more or less edged and slightly invaded by dark fuscous irroration; edged inwardly on both sides of fold by blackish raised scales. Second fascia from costa to dorsal margin, expanding dorsally, mostly overlaid on apical side with dark fuscous irroration, edged inwardly from center of wing to fold by blackish raised scales and outwardly by blackish tuft just above end of fold. Ante-apical fascia somewhat invaded by blackish fuscous irroration. Apical margins from before fascia on both sides lined with blackish fuscous scales slightly tipped white. Cilia irrorated fuscous and white except at tornus, which is fuscous. Hind wings whitish overlaid brown fuscous, cilia light fuscous. Abdomen fuscous, tip and underside yellowish white. Antennæ with basal joint fuscous brown, the flagellum with alternating brown and whitish annuli, the lighter ones wider. Palpi with white scales which have an ante-apical blackish infusion; second joint whitish on innerside except anterior margin, very narrowly white at tip; terminal joint rather rough, white at base, this white extending somewhat apically on inner side, tip white. Head and thorax white but heavily infused fuscous, or brownish fuscous, and finely irrorated white; face sordid whitish, shining; thorax browner anteriorly, sometimes browner on apex, with a scale tuft darker than general thoracic color at the tip of each patagium. Legs white, overlaid dark fuscous except at apices of joints and hairs of hind tibiæ. Male genitalia with broad almost bluntly pointed uncus, harpes short, slender, acute; vinculum with a pair of "lyre-shaped" posterior arms, projecting obliquely outward at base, then curving directly caudad, setose at tips; anellus with pair of posterior projections, enlarged and setose at tips; ædœagus a blunt slightly tapering tube, curved ventrally, projecting slightly beyond tips of posterior projections of anellus (see Figure 3). Female genitalia as in Figure 4.

Holotype, male, No. 3590, Museum California Academy of Sciences, reared May 8, 1931, from larva taken April 25, 1931,

by Dr. H. E. Burke and myself, boring in a partially developed bud of Monterey Pine (*Pinus radiata* Don.) at Palo Alto, California (Stanford Campus). Allotype, female, No. 3591, with same data except the emergence date of May 14, 1931. Thirty-nine paratypes reared from the same host are included in the type series with larvæ collected at the above locality and date, and also some which I collected as larvæ on May 3 in Santa Rosa. Adult emergence dates are from May 7 to May 25. Paratypes are in the collections of the United States National Museum and Miss Annette F. Braun.

The species is named in honor of Dr. H. E. Burke, who discovered it destroying pine buds in a small stand of young pines at the type locality. The trees in Palo Alto and Santa Rosa are artificial plantings, so the original home of *Exoteleia burkei* is unknown. This is the case with a number of Microlepidoptera described from the San Francisco bay region that feed on trees not native to that area. It may be noted in passing that a Hymenopterous parasite of this moth is established at Palo Alto.

The larva of *burkei* is 3.5-4.5 mm. long. Head black. Thoracic shield dark fuscous brown, narrowly bisected. Anal shield dark fuscous brown. Body yellow, infused brownish, especially on dorsum and posteriorly. Tubercles minute, slightly darker than body; hairs rather short and slightly yellowish fuscous. Prolegs small, 4 to 5 crochets. Pupa: 4 mm. long; brown; fore legs narrowly separated by the maxillæ, which are only slightly longer. Wings, hind legs, and antennæ ending on posterior edge of fifth abdominal segment. Segments six and seven of the abdomen apparently slightly movable. No cremaster at apex of abdomen, hooked hairs present.

The damage the larvæ of this species do is rather noticeable, but apparently not very serious. In neither stand where the species was observed were enough young shoots killed to appreciably retard growth (the Palo Alto trees were not in good general condition due partly to the nature of their location) and none of the terminal buds showed signs of attack. The infested bud starts to develop, but due to the presence of this caterpillar, growth is arrested, the young shoot often droops over, and by the first of May is brown and dry. The work of *Rhyacionia pasadenana* (Kearf.) in Monterey Pine buds differs in that the bud is hollowed out before it has a chance to start growth.

Exoteleia burkei is very close to the eastern *E. pinifoliella* (Chambers). It differs from *pinifoliella* most notably in the larval habit: the caterpillar of the eastern species is strictly a needle miner. Mr. August Busck, who kindly sent me specimens of *pinifoliella*, writes: "Your Monterey Pine species has genitalia in both sexes nearly identical with our eastern *pinifoliella*; in the few slides before me I think I detect slight differences . . . but it will take many carefully dissected specimens to make sure these differences are constant. Your species has unmistakably a strikingly dark head and thorax, quite different from the light-colored eastern species, and if . . . its larva is a borer in the buds and not a leaf miner, I would consider it a distinct species. So far as I know, from many rearings in various localities, *pinifoliella* is always a true leaf miner. . . ." According to the single slide of the male genitalia of *pinifoliella* which I have from the specimen Mr. Busck sent, there appear to be a number of slight differences, as compared to *burkei*. In *pinifoliella* the base of the uncus is narrower and the sides not sinuate; the "lyre-shaped" posterior projections of the vinculum (situated just below the anellus) are distinctly more attenuate, longer, curved more sharply outward at the base enclosing a greater space, slightly recurved apically, and the tips farther apart; the harpes reach almost to the tips of these projections; the ædœagus is probably not as long. There may be a slight difference in the venation of the fore wing: 5 at base is distinctly farther from the origin of 3 plus 4 in *burkei* than in my single slide of *pinifoliella*, but this cannot be positively proven on the basis of the material at hand.

The genus *Exoteleia* Wall. contains four species besides the two noted above. Of these four, two occur in North America. *Exoteleia dodecella* (Linn.), native to Europe, has appeared on this continent within the last few years. It is somewhat larger than the new species, generally gray, and with veins 6 and 7 of the hind wings more nearly parallel. Mr. Busck writes that the male genitalia of this species is very similar to that of *pinifoliella* (and therefore to the new species). *Exoteleia californica* (Busck) is predominantly white.

Gelechia braunella Keifer, n. sp.

I take pleasure in naming this Lupin-feeding, tan-colored

moth for Miss Annette F. Braun, who kindly determined the species as new for me.

Fore wings tan, basal three-fourths lightly irrorated fuscous; heavier irroration along costa; apex of wing beyond fascia darker due to general fuscous infusion. A small fuscous indistinct dot near central base, another slightly further out on costa, a third at basal sixth on costal side of fold, often opposed by another on dorsal side. Stigmata as fuscous spots: plical just beyond basal third, often edged with whitish ochreous scales before and after; first discal obliquely outward above plical, often edged with whitish scales before and after; second discal just beyond one-half, tending to run into a large transverse blotch, with whitish scales edging inner side of stigma proper; transverse fascia just before apical fourth, somewhat outwardly angulate in center, sometimes slightly lighter than ground color, irregularly edged with light fuscous irroration inwardly and noticeable blotches at costa and tornus. Darker apical area with more or less distinct tan dots around apex within margin; scales along margins slightly tipped white. Cilia tan, infused fuscous toward base. Hind wings tan, infused fuscous. Palpi with second joint tan, variable but usually cream-colored internally with slight or no fuscous irroration and with external side more or less heavily irrorated, brush somewhat fuscous infused; terminal joint heavily overlaid fuscous but with scattered light tan scales and light tip. Head and thorax tan, head above and thorax irrorated lightly with fuscous and with a slight general fuscous infusion; patagia and thorax often tipped with fuscous. Abdomen light fuscous, tipped with light ochreous. Legs tan, irrorated and overlaid fuscous except at apices of joints and hairs on posterior tibiæ. Male genitalia (Figure 5), symmetrical; with broad uncus, hairy on lower posterior margins internally; gnathos moderately long, slender, pointed, downcurved; harpes long, slender lanceolate, curved downward and somewhat inward; anellus represented by a setæ, bearing projection at base of each harpe; ædœagus rather long, slender, curved somewhat dorsally and enlarged apically. Female genitalia with posterior half of ductus bursæ chitinized; bursa and anterior half of duct set with minute spinules; signum as in Figure 6. Alar expanse 16 to 18 mm.

Type, male, No. 3592, Museum California Academy of Sciences, reared May 25, 1928, from a larva taken by the writer on *Lupinus albifrons* var. at the Marysville Buttes, Sutter County, California, May 2, 1931. Allotype, female, No. 3593, Museum California Academy of Sciences, reared June 1, 1928, from same host, larva taken near Oroville, California. Paratypes include specimens from Phœnix Lake, Marin County, reared from *Lathyrus vestitus* Nutt.; specimens from Pentz and Yankee Hill, Butte County, hosts: *Lupinus albifrons* var.

and *Lathyrus sulphureus* Brew.; and examples from Big Bend Mountain, Butte County, altitude 1500 to 2000 feet, hosts: *Lathyrus sulphureus* and *Lupinus* spp. In some specimens, especially the higher Sierran individuals, the fuscous coloring tends to evenly cover the entire wing surface.

Description of larva from Phœnix Lake, Marin County: Length 12 to 14 mm.; head and shield black, remainder of prothorax and entire mesothorax a very dark reddish brown or purplish black; metathorax ringed with white anteriorly, but otherwise concolorous with abdomen, which is whitish or creamy white; six reddish or brownish red longitudinal stripes, somewhat broken and irregular, occupy the dorsal half of the body from the anterior white ring of the metathorax to the ninth abdominal segment; tubercles not large, black, hairs slightly fuscous.

Gelechia braunella arborei Keifer, n. var.

I give this varietal name to the coastal form of the species which occurs in the fog belt and is distinctly larger in the adult stage (19 to 21 mm. in alar expanse) and much lighter. The fore wings are light tan with much less fuscous irroration than the type, and no darker apical fifth. Instead of the tan dots within the apical margin there are interspaced fuscous dots. The transverse fascia is slightly visible, the palpi are but slightly fuscous irrorated. In genital characters, however, the variety is the same as the type.

Holotype, male, No. 3594, Museum California Academy of Sciences, reared June 28, 1927, from a larva taken by the writer from *Lupinus arboreus* Sims. May 21, 1927, on the San Francisco sand dunes in an area since built over with houses and landscaped with imported plants. Allotype, female, No. 3595, Museum California Academy of Sciences, reared May 7, 1927, from a San Francisco larva also on *Lupinus arboreus*. There are seven paratypes from San Francisco included in the series. Larvæ of this variety occur rarely on *Lupinus chamissonis* Esch. Emergence dates for adults of the species and variety throughout the entire range are from May 4 to July 15. Paratypes of the species and variety are in the collections of Miss Annette F. Braun and the United States National Museum.

The larva of the fog-belt variety is the same as that described, but the body color is infused with a grayish or light brownish shade. Thus we have darker larvæ and lighter adults on the open coast, and the opposite in the interior. The larval

habit on Lupin consists of tying together lengthwise three or four leaflets and forming a retreat therein. The leaflets are then skeletonized, or occasionally partially mined. A single larva probably forms a number of these during its lifetime. These tied leaves may be rather conspicuous on the Lupin bush. Only perennial Lupins are attacked, as far as my observations go. On *Lathyrus* (native pea) the leaves are also tied together, usually two leaves with their upper surfaces adjoining, between which the larva may be found. Sometimes there is evidence of skeletonization on the sides of this shelter, but usually the apical part of the *Lathyrus* leaf is eaten away.

Gelechia demissæ Keifer, n. sp.

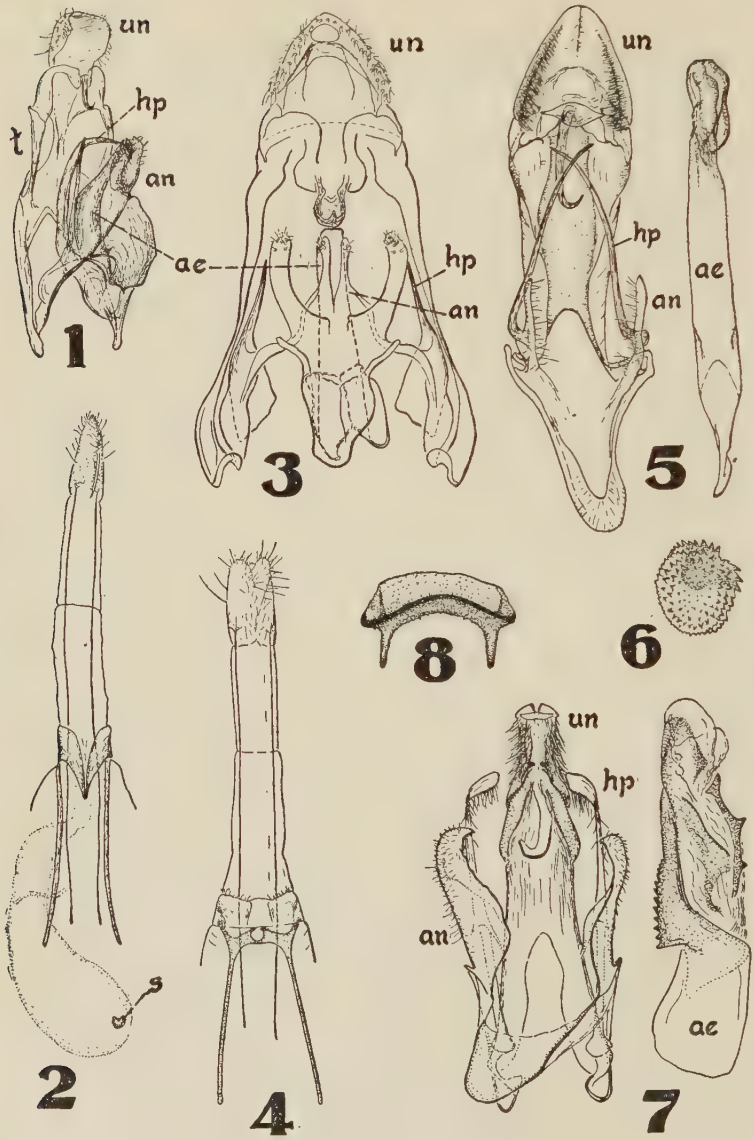
The work of the caterpillars on their food plant, for which the species is named, called this obscurely marked moth to my attention.

Alar expanse 17-22 mm. Fore wings with scales fuscous or fuscous gray, rather whitish at base, but black-tipped. General appearance dull dark fuscous. A sparse irroration of whitish or ochreous white scales over wing surface. A more or less noticeable light brownish infusion often present; in extreme forms this color overlays the costal third of the wing, the apical veins may be vaguely outlined, and it may also cover the otherwise whitish scales. Stigmata as blackish spots, usually distinct: plical at basal third preceded or followed, or both, by light scales; first discal of one or two spots (one above the other) obliquely outward from plical, usually surrounded by whitish or ochreous scales; second discal tending to be a fairly large transverse blotch at apical third, preceded or followed, or both, by the light scales. Transverse whitish fascia, somewhat outwardly angulate, at apical fifth, nearly always visible at ends and often interrupted centrally. Apical margins of wing beyond fascia lined with indistinct blackish spots, these spots sometimes rather confluent, or interspersed with light scales, or edged internally with whitish or whitish ochreous. Cilia whitish or ochreous whitish, slightly gray infused, irrorated blackish on basal half and transversely lined fuscous on apical half including tips. Hind wing whitish, generally infused fuscous which is heavier toward margins and along veins, apex somewhat darker. Cilia creamy-white infused light fuscous around apex and along outer margin. Basal half (length of cell) of underside of male hind wing beset with moderately long hair scales; these scales directed obliquely outward toward the outer angle, except row from anterior vein of cell which are directed posteriorly and are parallel. Palpi whitish but heavily infused fuscous or dark fuscous and irregularly mottled white; second joint variable but lighter on inner side, which is sometimes

almost all white, though usually only white near base posteriorly, narrowly tipped with white apically; terminal joint mottled white. Head light fuscous to whitish, irrorated with blackish, face lighter. Thorax dull dark fuscous, a slight brownish infusion, sometimes brownish apically, often two small ante-apical whitish spots. Antennæ with dark fuscous basal joint, irrorated and tipped with white; flagellum with alternately whitish and blackish annuli. Legs white, irrorated and overlaid with fuscous except at apices of joints and on hairs of posterior tibiæ. Abdomen creamy white, infused fuscous at extreme base, first three or four joints ochreous, the remainder ochreous or creamy white, infused fuscous on basal three-fourths; tip whitish; below: infused dark fuscous laterally, irrorated with fuscous centrally. Male genitalia (Figure 7) partly asymmetrical; tegumen including uncus somewhat narrow and gradually tapering, uncus narrow laterally, convex dorsally, bluntly pointed, hairy on all sides; gnathos hook-shaped; harpes spatulate, equal, rather attenuate, hairy along ventral margin, curved inward at apex otherwise straight, ending at base of uncus; vinculum and anellus asymmetrical; vinculum an anteriorly projecting lobe inclined to the right; anellus as two wide lobes ventral to the harpes and projecting posteriorly, these lobes pointed, the points bent ventrally, right lobe larger, both lobes set with small hairs on dorsal margin and outer side; ædœagus a partially chitinized tube, basal third obliquely inclined ventrally, the remainder abruptly bent horizontally, a convex saw-toothed longitudinal ridge centrally placed on dorsal right, a chitinized ante-apical longitudinal piece on ventral left, bearing from one to three spines, the anterior persistent. Female genitalia with somewhat convoluted ductus bursæ, which is heavily chitinized on posterior half; anterior part thickly set with small spines, which are largest next to the chitinized portion; bursa spinulate; signum (Figure 8) a pair of basally united spines.

Holotype, male, No. 3596, Museum California Academy of Sciences, reared June 19, 1931, from larvæ which I collected on *Prunus demissa* (Nutt.) at Mark West Springs, Sonoma County, California, May 3, 1931. Allotype, female, No. 3597, Museum California Academy of Sciences, from the same locality, which emerged June 20. The series includes twenty-three paratypes from this location that emerged from June 7 to July 20. I know of no described species having the peculiar hair scales on the underside of the male hind wings found in this species. Paratypes are distributed to Miss Annette F. Braun and to the United States National Museum.

Larva: length 13-15 mm. Head light brown, sometimes more or less fuscous infused, interocellar area dark fuscous. Shield large, dull ochreous brown, pale anteriorly, narrowly bisected. Variably



Explanation of Plate

Fig. 1, *Eucordylea mackiei,* male genitalia; Fig. 2, *E. mackiei,* female genitalia; Fig. 3, *Exoteleia burkei,* male genitalia; Fig. 4, *E. burkei,* female genitalia; Fig. 5, *Gelechia braunella,* male genitalia; Fig. 6, *G. braunella,* signum of female genitalia; Fig. 7, *Gelechia demissæ,* male genitalia; Fig. 8, *G. demissæ,* signum of female genitalia. The lettering: æ—ædœagus; an—anellus; hp—harpe; s—signum; un—uncus.

infused blackish fuscous posteriorly, especially from the lateral posterior angles; edged with white laterally and posteriorly. Anal shield sordid yellow. Body fuscous brown, lined with white; tubercles small, fuscous, somewhat contrasting. A thin, faint mid-dorsal white line, much broken; subdorsal and supraspiracular lines, much the same but heavier. Body sparsely spotted with white between these lines. Subspiracular line white, wide, heavy, continuous. A pair of rather broken moderately wide ventral white lines running just inside prolegs. Crochets of prolegs biordinal, longer inwardly, 32-44.

The gray, white-striped larvæ of this species may be found in April and May tying the terminal leaves on young shoots of this choke cherry. Considerable damage is done the cherry, as the tips are eventually killed. The larvæ live within the mass of living and dead leaves which result from their activities and continually add to the nest, causing the tip to droop. Attempts to feed the caterpillars on cultivated plum leaves were unsuccessful, but they accepted leaves of *Prunus ilicifolia.* I do not know whether they will attack cultivated cherry or not.

Gelechia sistrella Busck

Meyrick lists this species from California (as well as Arizona) in the Genera Insectorum, fasc. 184, 1925. I do not know of other references reporting it from California, so offer this note for what it is worth. On October 15, 1930, F. T. Scott collected small larvæ of this moth on Alkali Blite (*Sueda morquini* Greene) at Visalia, California. Adults emerged from late October to early December, which correspond exactly to Busck's description, except that the palpi are fuscous at the base. Only small larvæ were noted, but these have the following color characters:

Head brown, more or less mottled and clouded with fuscous, especially posteriorly and at sides. Prothoracic shield lighter brown than head, more or less infused fuscous especially along lateral and postmargins; obscurely bisected by moderately wide whitish line. Body dull ochreous pink, somewhat overlaid with a faint white. Anal segment and shield rather more ochreous than body.

It is a pleasure and privilege for me to acknowledge the help of Miss Annette F. Braun, Cincinnati, Ohio, and Mr. August Busck of the United States Bureau of Entomology, Washington, D. C. They are always very willing and generous with whatever information they can offer. Without the assistance of these eastern specialists, systematic work on Microlepidoptera in the West would be impossible.

TWO NEW SPECIES OF ELEODES FROM UTAH
(Coleoptera: Tenebrionidæ)

BY FRANK E. BLAISDELL, SR.

Stanford Medical School and California Academy of Sciences
San Francisco, California

The physical features of the State of Utah are greatly diversified, presenting high mountains, broad arid valleys and desert plateaus. The fauna and flora present variety corresponding with that of the topography. The coleopterous fauna is particularly interesting and at times unique. Prof. Vasco M. Tanner, head of the Department of Zoölogy of the Brigham Young University, has from time to time made biological expeditions to different parts of the State, and it is due to this research that the author is enabled at the present time to describe the two interesting species of *Eleodes* given below:

Eleodes tanneri Blaisdell, n. sp.

Form ovate to subovate, robust, twice as long as wide, elytra asperately sculptured. Color black, luster opaque.

Head about as long as wide, scarcely as wide as the pronotal apex, canthi not more prominent than the eyes; sides moderately convergent anteriorly, rather strongly arcuate over the antennal insertions, slightly emarginate at the oblique sutures, thence straight to the epistomal apex, the latter sinuato-truncate with angles obtusely rounded; frons nearly plane, being slightly irregularly convex, densely irregularly and quite coarsely punctate, frontal suture obsolete or a mere line. Labrum transverse, arcuate at apex, with a small abrupt emargination at middle, coarsely and densely punctate, laterally with rather long, rigid, anteriorly directed setæ. Antennæ long, extending beyond the pronotal base, not incrassate, third joint twice as long as the fourth, second short and about as long as wide; fourth a little longer than the fifth, the latter to the eighth inclusive quite equal in length and width, eighth subtriangular, ninth and tenth oval and slightly transverse, eleventh ovate and truncate at apex, slightly wider than long.

Pronotum a fourth to a third wider than long, apex transverse in feeble circular arc, angles obtuse and not in the least prominent; sides rather strongly arcuate in anterior three-fourths, thence moderately sinuate, becoming parallel before the subrectangular basal angles; base transverse, slightly wider than the apex, often feebly truncato-sinuate before the scutellum; disk moderately convex, most so transversely, densely and moderately strongly punctate, the punctures becoming very dense laterally.

Elytra oval, truncate at base, a fifth to a sixth wider than long, a little more than twice the length of the pronotum; humeral angles distinct and obtuse; sides moderately arcuate, gradually converging in about apical fourth, apex rather narrowly rounded; disk moderately convex, strongly and arcuately deflexed laterally, apical declivity arcuately and rather abruptly declivous; surface very densely and scabrously tuberculo-submuricate, tubercles small and obliquely directed, punctures very small at tip of the tubercles, each giving origin to a very short, stout seta; there is distinct evidence of a lineal arrangement when viewed longitudinally.

Undersurface of the body somewhat shining, densely and more or less rugoso-punctate. Abdominal segments differ in length in the sexes. Legs moderate in stoutness, somewhat relatively long, especially the middle and posterior; metatarsi about five-tenths of their length shorter than their metatibia.

Male. Narrower and subovate. Pronotum subquadrate, about a fourth wider than long. Elytra widest at middle. Abdomen horizontal, moderately convex, rather broadly impressed in middle third of first two segments; third and fourth segments subequal, fifth as long as the combined length of third and fourth; second a little longer than the postcoxal part of the first. Protibial spurs very unequal in size, the anterior or inner rather stout, gradually narrowed to apex and about twice as long as the posterior.

Female. Ovate and robust. Pronotum transverse, about a third wider than long; elytra more inflated. Abdomen rather strongly convex; third segment quite equal in length to the fifth and twice as long as the fourth, second equal to the postcoxal part of the first. Anterior protibial spurs unusually short and broad, in the holotype about as wide as long, the posterior short.

Measurements: (Types) Length 14-16 mm.; width 6-7.5 mm.

Holotype, female, No. 2956, and allotype, male, No. 2957, in the author's collection, Museum of the California Academy of Sciences. Collected by Prof. Vasco M. Tanner and Anson Call, Jr. I take pleasure in dedicating the species to Professor Tanner, who possesses two paratypes.

Type locality: Holotype and allotype were collected at Elk Ridge, Bears Ears, San Juan County, Utah. Two paratypes in Professor Tanner's collection were taken on Mount Tukuhnikivats, La Sal Mountains, San Juan County, Utah. Other specimens from Blanding, San Juan County, and Moab, Grand County, Utah. Twelve specimens are in Professor Tanner's collection.

Tanneri belongs to the subgenus Melaneleodes and to the Quadricollis Section, as indicated by the very stout anterior protibial spurs of the female and should precede *rileyi* Casey

in our lists. *Rileyi* is robust and much shorter than either *quadricollis* Esch. or *humeralis* Lec.; the anterior protibial spurs of the female are unusually long, parallel and moderate-arcuate. In *tanneri* the anterior protibial spurs of the female are broad and about as wide as long; this extreme form may be due to wear, both anterior spurs are exactly alike. The elytral sculpturing in *rileyi* is quite smooth, while the elytra in *tanneri* are moderately roughly sculptured.

Eleodes strumosa Blaisdell, n. sp.

Form ovate, somewhat robust, about twice as long as wide. Color black, fifth abdominal segment more or less rufous in the types; surface alutaceous with luster distinctly dull. Pubescence nearly recumbent, very inconspicuous and setigerous in character.

Head about as long as wide, equal in width to the pronotal apex, canthi not more prominent than the eyes, the latter moderately convex; sides convergent anteriorly, evenly arcuate over the antennal insertions, slightly emarginate at the oblique sutures, thence straight to the well rounded epistomal angles; epistoma broadly and arcuately sinuate at apex; frons very slightly convex, broadly and feebly impressed along the position of the frontal suture as well as within the supra-antennal convexities, sutures obsolete; densely and rather coarsely punctate, punctures much smaller and denser in the occipital region, a small impunctate area at middle near the vertex. Labrum transverse, apex and sides arcuate, the former with a small quadrate emargination at middle; densely punctate, punctures finer and sparser toward base, each with a rigid, rather long and anteriorly directed seta. Antennæ slender, not incrassate, extending beyond the pronotal base; second joint slightly longer than wide, third elongate and about one-sixth of its length shorter than the combined lengths of joints four and five; fourth and fifth equal in length, each a little longer than the sixth; joints six to nine inclusive quite equal in length, eighth subtriangular, ninth triangulo-oval, tenth circular to slightly oval; eleventh ovate, a little longer than wide and obliquely truncate at apex.

Pronotum about one-fourth to one-third wider than long; apex broadly and slightly sinuate in feeble circular arc, angles well rounded and not in the least prominent anteriorly; sides rather strongly and nearly evenly arcuate from apex to base, being slightly less arcuate near base, marginal bead very fine to almost obsolete; base subtruncate in feeble circular arc, one-sixth wider than the apex, angles obtuse-angular; disk evenly and strongly convex, densely and coarsely punctate, punctures somewhat pit-like, each with a rigid recumbent black seta.

Elytra about one-fourth longer than wide, base transverse and scarcely wider than the pronotal base; humeri broadly rounded, continuously so with the moderately strongly arcuate sides, apex broadly rounded when viewed from above, but somewhat ogival when seen obliquely from behind; disk strongly convex, slightly less so in the central area, arcuately and very abruptly declivous apically; densely and evenly punctate, punctures coarse, the surface immediately adjacent to them anteriorly, slightly raised, smooth and shining; each puncture with a recumbent inconspicuous black seta. Scutellum small and triangular.

Undersurface of the body densely punctate, propleuræ tuberculose, tubercles small, round and polished; prosternum punctato-tuberculate. Abdomen more or less rugose; fifth segment more or less rufous. Legs of moderate length and rather slender; tarsi slender, the metatarsi about three-fifths as long as their tibia. Tibial spurs small in both sexes.

Male. Narrower, relatively less robust and longer. Abdomen noticeably oblique to the sterna, less than moderately convex, broadly and rather strongly impressed in middle third of first three segments. Protibial spurs moderately small, the anterior about a third longer than the posterior. First joint of the protarsi densely clothed beneath with golden pubescence; second joint with a small cylindrical tuft at tip beneath blocking the plantar groove. First joint of the mesotarsi with a similar small and prominent tuft at apex beneath, also blocking the plantar groove. Fifth abdominal segment equal in length to the third and fourth taken together; second equal to the postcoxal part of the first; third slightly shorter than the second, fourth not quite as long as the third.

Female. Moderately robust. Abdomen strongly convex and horizontal; second segment equal to the postcoxal part of the first; fifth about one-seventh longer than the second and twice as long as the fourth; third one-third longer than the fourth. Tarsi without pubescent tufts beneath, plantar grooves entire between the tufts of apical spinules.

Measurements: (Types) Length 12-13 mm.; width 5.5-7 mm.

Holotype, female, No. 2958, and allotype, male, No. 2959, in the author's collection, Museum of the California Academy of Sciences. Collected by Prof. Vasco M. Tanner, who possesses three paratypes.

Type locality: Holotype is from the Deep Creek Mountains, Tooele County, Utah, and the allotype is from Lehman Cave, Mount Wheeler, White Pine County, Nevada. The three paratypes are from the Deep Creek Mountains, Tooele County, Utah. Four other specimens in Professor Tanner's collection are from the same region as the paratypes. Mount Wheeler,

Nevada, is approximately seventy-five miles southwest of the Deep Creek Mountains.

Strumosa belongs to the subgenus Blapylis and should precede *caseyi* Blais. in our lists, from which it differs by its strongly convex pronotum and elytra, in this character resembling *neotomæ* Blais. In *caseyi* the pronotal sides are feebly sinuate in basal eighth and not noticeably constricted, and besides the pubescence is more conspicuous, its facies is somewhat *Amphidora*-like, and its color and pubescence reminds one of *Stenotrichus* Lec. In *strumosa* the pronotal sides are arcuate from apex to base. From other related species it differs by its even and equal subasperate and rather weak sculpturing.

Change of names:

Eleodes paradoxa n. n. This new specific name is proposed to take the place of *montanus* Blais., which is preoccupied for a Mexican species. **Eleodes patulicollis** n. n. for *dilaticollis* Blais., a name that has been used by Champion for a Mexican species, and therefore is preoccupied.

Note on Pacific Coast Sphæridiinæ

In addition to the species listed from the Pacific Coast by Blackwelder (Pan-Pac. Ent., VIII, 1931, pp. 19-32), I have in my collection from Washington *Sphæridium bipustulatum* F. (Seattle, 1928) and *Cryptopleurum minutum* F. (Seattle and Vashon Island).

Washington localities may likewise be cited for the following species, extending their ranges as indicated by Mr. Blackwelder's paper: *Sphæridium scarabæoides* L. (Chehalis, 1913; Seattle, 1914; Chewelah, Blue Mountains, and Lake McElroy, M. C. Lane). *Cercyon marinus* Thomson (Sprague, M. C. Lane), *C. lateralis* Marsh. (Seattle), *C. hæmorrhoidalis* F. (Seattle), *C. pygmæus* Ill. (Evans Creek, King County), (Vashon Island), *C. opacellus* Fall (Seattle), *Megasternum posticatum* Mann. (Chehalis, Loveland, Vashon Island). Also I have *C. quisquilius* L. from Terrace, B. C., collected by Mrs. W. W. Hippisley and received through Mr. Frost.—Melville H. Hatch.

TWO NEW SPECIES OF MACROTYLUS FIEBER FROM THE WESTERN UNITED STATES

(Hemiptera, Miridæ)*

BY HARRY H. KNIGHT
Ames, Iowa

Macrotylus polymonii Knight, n. sp.

Allied to *multipunctatus* Van D. but nearly black in color, antennal segments longer and tylus more vertical; pronotum, clavus, and corium with white ground color, each black bristle-like hair set in a round black spot, the spots largely coalescing and giving the impression that the dorsum is half black.

Male. Length 4.2 mm., width 1.7 mm. Head: width .69 mm., vertex .39 mm.; black, bucculæ and geminate mark on base of vertex and collum, white; frons tumidly convex, tylus strongly vertical. Rostrum: length 1.34 mm., reaching upon middle of hind coxæ. Antennæ: segment I, length .39 mm., black, tip white; II, 1.16 mm., black, narrow base and tip white; III, .86 mm.; IV, .36 mm. Pronotum: length 1.03 mm., width at base 1.17 mm.

Clothed with short, black, bristle-like hairs; color black, dorsum with white ground color and marked with coalescing black spots as described above; mesoscutum with yellowish white spot each side, calli black. Cuneus black, base, narrow membrane margin and apex white. Membrane black, veins opaque white, a small clear spot bordering apex of cuneus, also a rounded pale spot beyond, near membrane margin. Legs black, tips of femora becoming pale.

Female. Length 4.3 mm.; width 1.8 mm. Head: width .69 mm., vertex .43 mm. Antennæ: segment I, length .41 mm.; II, 1.12 mm.; III, .84 mm.; IV, .34 mm. Slightly more robust but very similar to the male in form and coloration.

Holotype: Male, August 14, 1931, altitude 10,000 feet, Mount Rainier, Washington (H. H. Knight). *Allotype:* same data as the type. *Paratypes:* 26 ♂ ♀, taken with the types on *Polymonium humile* R. & S., as determined by Dr. J. T. Howell. Mr. C. W. Getzendaner took the first specimens and called my attention to this interesting species. By careful searching we were able to hand-pick specimens from the host plant; I also observed a few cast nymphal skins sticking to leaves of the host. Paratypes will be deposited in collection

* Contribution from the Department of Zoölogy and Entomology, Iowa State College, Ames, Iowa.

of California Academy of Sciences and in the United States National Museum collection.

Macrotylus vanduzeei Knight, n. sp.

Distinguished from allied species by the truncated and slightly enlarged tips of the erect black bristles on dorsum; corium, except apex and the outer half of clavus, orange-colored.

Male. Length 5.1 mm., width 1.8 mm. Head: width .78 mm., vertex .38 mm., strongly elongated; black, spot on vertex and median line of frons pale, also more or less pale on bucculæ, lora, and juga. Rostrum, length 2.5 mm., reaching upon middle of venter. Antennæ: segment I, length .32 mm.; II, 1.51 mm.; III, .91 mm.; IV, .36 mm.; black, clothed with black pubescence. Pronotum: length .71 mm., width at base 1.47 mm.; black, basal half and anteriorly along lateral margins pale.

Dorsum clothed with erect black bristles, the tip of each bristle truncate and slightly enlarged. Scutellum and mesoscutum black; hemelytra orange-colored, embolium, apex of corium and of clavus, blackish; inner margin of clavus bordering apex of scutellum, anal ridge, and cuneus pale to whitish; membrane black, veins and spot at tip of cuneus pale, also somewhat paler on middle of membrane bordering cubitus. Ventral surface black, distal margins of ventral segments pale. Legs black, dorsal line on tibiæ and somewhat on middle of femora, pale.

Female. Length 4.6 mm., width 1.8 mm. Head: width .79 mm., vertex .41 mm. Antennæ: segment I, length .30 mm.; II, 1.51 mm.; III, .82 mm.; IV, .34 mm. Pronotum: length .67 mm., width at base 1.4 mm. Slightly more robust than the male but very similar in form and coloration.

Holotype: Male, May 29, 1930, San Susana, Ventura County, California, "collected on sage" (Calif. Dept. Agr. No. 30405-10); No. 3598 Mus. Calif. Acad. Sci. *Allotype:* taken with the type; No. 3599, Mus. Calif. Acad. Sci. *Paratypes:* ♂, taken with the types; author's collection. ♂ ♀, Los Angeles County, California (Coquillett); U. S. National Museum collection. Named in honor of Mr. E. P. Van Duzee, to whom the writer is indebted for the opportunity of doing considerable work on the Miridæ in the collection of the California Academy of Sciences.

FOUR NEW BUPRESTIDÆ FROM ARIZONA

BY H. C. FALL
Tyngsboro, Massachusetts

Acmæodera lineipicta Fall, n. sp.

Moderately elongate, subdepressed, black bronzed; prothorax with lateral marginal yellow spot, elytra with discal and lateral yellow vittæ, the former occupying intervals 3-5 in anterior half or more, but becoming narrower toward the apex; the lateral vitta occupying the outer three intervals, the marginal interval with some black maculation posteriorly. Vestiture above of very fine erect blackish hairs mixed with some of paler tint on the pronotum, especially toward the sides; beneath with rather sparse whitish pubescence.

Head densely punctate, a moderate median impression.

Prothorax four-fifths wider than long, sides arcuately narrowed from base to apex, base not wider than that of the elytra; surface with moderately coarse punctures, which are close but not in contact on the disk, denser at sides.

Elytra narrowed from base to apex; striæ closely punctate, feebly impressed toward the suture, more distinctly so laterally; interspaces with a row of finer punctures.

Prosternum feebly trisinuate in front; abdomen sparsely punctured; apical ventral plate small, thin, evenly rounded.

Length (type) 8.7 mm.; width 3 mm.

Described from two examples, sex unknown, sent me by Mr. D. K. Duncan, who took them at San Carlos Lake near Globe, Arizona.

In form and structure nearly identical throughout with *hepburni*, of which it may prove to be a color variant or local race. As it comes from quite outside the known range of *hepburni* and no intermediates have been seen, it may, for the present at least, be given specific standing.

Type in my own collection; paratype returned to Mr. Duncan.

Acmæodera carlota Fall, n. sp.

Subcylindrical, moderately convex; piceous, head, thorax and body beneath more or less feebly bronzed; elytra with very irregular dull yellow markings which generally predominate over the dark areas; body above with fine erect brown or fuscous hairs, beneath sparsely clothed with cinereous hairs.

Head convex, a feeble median impression and a short vertical carina; fifth antennal joint abruptly broader than the fourth.

Prothorax unicolorous, not quite twice as wide as long, widest at middle, base and apex subequal, sides subevenly arcuate, side margins distinct only in front; surface punctures very coarse, shallow and polygonally crowded; median impression feeble, lateral impressions reduced to basal foveæ.

Elytra at base barely equal in width to the thorax, gradually narrowed posteriorly; striæ lightly impressed, coarsely punctate, intervals except the ninth narrower than the striæ, each with a row of fine punctures.

Ventral segments coarsely closely punctate, the last segment without trace of apical plate.

Length 5.75 to 6.8 mm.; width 1.75 to 2.2 mm.

Described from three examples taken on cactus blooms in April at Wheatfields near Globe, Arizona, by Mr. D. K. Duncan, to whom I am indebted for the short series before me. Type in my collection.

This small species belongs to the "Truncatæ" group of the genus, and in my table (Jour. N. Y. Ent. Soc., 1899, p. 28) runs to *cribricollis*. I have, however, already pointed out (Can. Ent., 1907, p. 241) that *cribricollis* was misplaced in the table and should go under "9" with *insignis* and *gemina* with which it agrees in having the antennæ gradually broader from the third joint.

Agrilus nodicornis Fall, n. sp.

Form rather slender and parallel. Head and thorax black, the former with obscure greenish luster; elytra black with dull blue-green luster along the suture, becoming purplish toward the sides posteriorly, a coppery stripe occupying the outer half or more of the elytra and extending from the base to behind the middle where it gradually blends with the purple tint at that point; beneath black, the metasternum and abdomen dark blue green. Pubescence silvery white, generally sparse and inconspicuous.

Head shallowly concave, the medial impression a little deeper on the vertex; surface punctate and moderately pubescent. Antennæ rather short, black, basal six joints with brassy-green luster; joints 1-3 elongate, 4 about as wide as long, its outer angle not produced, 5 and 6 swollen and compactly joined, 7-11 feebly serriform, the individual joints transversely subquadrate.

Prothorax slightly wider than long, subinflated anteriorly, sides parallel and broadly arcuate, sinuate posteriorly before the rectangular hind angles; front margin prominently rounded at middle, hind margin bisinuate and with shallow emargination before the scutellum; disk convex without median channel, surface moderately

shining and sparsely pubescent, coarsely strigose, and with sparse, fine punctures; hind angles carinate; lateral marginal line sinuate as viewed from the side.

Elytra at base perceptibly narrower than the thorax, at apical third subequal in width to the latter; sides with the usual post-humeral sinuation; disk neither sulcate or carinate and without trace of pubescent spots, the sculpture of the usual imbricate type; apices serrulate, subacute at the sutural angles, which, however, are not produced. Scutellum feebly convex at middle but not really carinate.

Pygidium without carina. Prosternal lobe feebly sinuate; intercoxal process subparallel behind the coxæ, the free visible apex widely emarginato-truncate. Abdomen moderately punctate and transversely rugulose, shining, apex of last ventral broadly rounded; tooth of tarsal claws only slightly turned inward.

Length 6.2; width 1.4 mm.

The type above described is a male, having the prosternum rather densely pubescent and the first and second ventral segments with a pubescent groove which does not reach the second ventral suture; the tibiæ are without perceptible apical spur or mucro.

Described from a single example sent me by Mr. D. K. Duncan. It bears label "Tucson, Arizona, July 2, 1924; A. A. Nichol."

In coloration and antennal formation this species is quite unlike anything hitherto known from our fauna. I am assuming the latter peculiarity to be normal, as it would seem to be since the two antennæ are identical in form, but if further examples should prove the structure to be a malformation the species would still have to take a position next to *muticus*, according to Mr. Fisher's table.

Melanophila arcuata n. sp.

Rather broadly oblong oval, subdepressed; black, head and body beneath with distinct æneous luster, pronotum with faint traces of the same, elytra not visibly æneous; upper surface with very sparse, short and inconspicuous pale hairs, integuments moderately shining.

Head densely punctate, front with a short fine median carina between two smoother, raised callus-like spots; occiput with a fine median impressed line.

Prothorax about three-fifths as long as wide, widest at middle, sides as seen from above nearly evenly arcuate, the base very little wider than the apex; hind angles sharply defined and slightly obtuse; surface densely punctate without any well-defined median transverse

strigosity, disk with an impression each side at about the middle of the length, lateral marginal line obsolete for a short distance in front.

Elytra oval, width five-eighths as great as the sutural length, base slightly wider than the base of the thorax, sides arcuate throughout, apices rounded and finely serrate. Punctures close, moderately coarse, becoming subgranulose at base and with a tendency toward an arrangement in transverse lines; each elytron with two broad ill-defined discal impressions and three obtuse subcostiform lines, of which the one nearest the suture is longest but not reaching either base or apex.

Prosternum broadly feebly emarginate in front, the intercoxal process suddenly narrowed at tip; surface very densely punctate and with erect cinereous hairs; metasternum and abdomen more sparsely punctate.

Length 9.6 mm.; width 4.25 mm.

Arizona: Grand Canyon of the Colorado (north rim), August 18, 1929. A single example of uncertain sex collected by Miss Edith Mank of Lawrence, Massachusetts, who kindly permits me to retain the type.

This species is probably closest to *drummondi,* but lacks the strigosity of the pronotal surface characteristic of that species, and the sides of the thorax are more evenly arcuate and more narrowed behind.

Scorpionidea From Washington

The author has in her collection seven specimens of *Vaejovis borcus* (Girard) collected by Mrs. Rose C. Movius on May 1, 1931, at Selah (Yakima County), Washington. This record is of interest since Ewing (Proc. U. S. Nat. Mus., 73 (9), 1928, p. 12) records this species from Idaho and Oregon to North Dakota, Nebraska and Arizona, but makes no mention of Washington specimens. Furthermore, it is the first species of the order Scorpionidea to be recorded from the state.—Harriet Exline, University of Washington.

NEW SPECIES OF PHLEPSIUS WITH NOTES ON OTHERS

(Homoptera Cicadellidæ)

BY E. D. BALL
University of Arizona, Tucson

One hundred species of North American Phlepsids have been described to date. Of this number, eighty-two appear to be distinct and five or six are worthy of varietal rank. The writer has previously discussed the synonomy in the broader-headed groups, and in the present paper the forms with narrower heads are similarly treated.

Phlepsius (Iowanus) spatulatus V. D. is common and widely distributed in the Southwest, and is quite variable in the size and length of the spines that form the margin of the central notch of the female segment. *P. cinerosus* O. & L. from New Mexico appears to be a small example of this species with the spines almost wanting. The desert forms are usually smaller and paler than those from the mountains or plains. *P. sabinus* S. & DeL., on the other hand, is apparently the dark mountain form with the spines rather long and the notch reduced. The writer has found this the common form in Sabino Canyon.

Phlepsius (Texananus) neomexicanus Bak. is another common form in the Southwest, and is somewhat variable in its genital characters in both sexes. *P. incurvatus* O. & L., as shown on their Plate 33, seems to be the typical form of this species, while their figures of *neomexicanus* on the same plate are of an extreme variation, especially in the length of the male pygofers. In the same way their figure of *excultus* on page 339 is much more nearly typical than the one on Plate 23.

Phlepsius (Texananus) oregonus Ball, n. sp.

Resembling *superbus,* slightly narrower, paler, with a pointed vertex and male pygofers covered by the plates. Length 6-7 mm.

Vertex longer and more definitely pointed than in *superbus* or *mexicanus,* nearly twice as long on middle as against the eye. Anterior margin thick, but not rounding over to the front. Front straight in profile, relatively narrow for the group. Color brown, slightly paler than in *superbus,* with a darker face, but not as dark as in that species. The light areas of the elytra broken up in fine, milky

or ivory points that are conspicuously arranged in rows along the costa and claval suture and sometimes along the veins. Female segment half longer than the preceding, narrowing posteriorly, the margin broadly roundingly excavated halfway to the base. Male valve short, obtusely rounding, one-half the width of the plates. Plates together as wide as the last segment, semicircular in outline, and clothed with stiff spines on the margin. Pygofers not visible or only as a small, dark point under the plates.

Holotype ♀, allotype ♂ and four paratypes, Medford, Oregon, August 14; one paratype, Wenatchee, Washington, August 18; one, Santa Margarita, California, August 6; four, Pasadena, California, in June; and two, Ti Juana, Mexico, in June, all collected by the writer.[1]

Van Duzee described *superbus* from North Carolina and Arizona and correctly figured and described the deep, narrow emargination of the female segment, the pointed valve, subquadrangular plates, and long pygofers of the male which will at once distinguish it from the above species. The writer has collected *superbus* commonly in Florida and southeastern Arizona and has material from Mississippi and Texas, while all the material examined from California and the Northwest belongs to *oregonus*.

Phlepsius (Texananus) graphicus Ball is quite variable in the depth and width of the median excavation on the female segment and the size and shape of the adjoining projections. *P. marmor* S. & DeL. appears to be founded on a normal variation in the species.

Phlepsius annulatus O. & L. (Preoc), = *lathropi* Baker, is another species with a similar pattern which will need to be studied when more material is available. California examples are smaller than *graphicus* with a longer vertex and a bilobate marking on the commissure, but vary toward that species in genitalia.

Phlepsius (Texananus) cumulatus Ball is a similar but more definitely reddish species with a distinct but also variable female segment. *P. notatipes* O. & L. represents a common variation in the segment. Var. *arctostaphylæ* Ball a smaller, darker form that is probably a distinct species was omitted entirely by Osborn and Lathrop.

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1 Types of all species in the author's collection unless otherwise stated.

Phlepsius (Texananus) ovatus V. D. was limited by Osborn and Lathrop to the southern plains and Oregon. It is extremely common and widely distributed. Examples are at hand from North Dakota to Oregon and every state south to southern Mexico. *P. delicatus* O. & L. was founded on a California example.

Phlepsius (Dixianus) denudatus carpolus Ball, n. var.

Resembling ***denudatus*** in form and structure. Vertex inclined to be shorter and wider. Length 4.5 to 5 mm. Vertex with four black dots in a row before the base, pronotum with irregular spots behind the eyes, scutellum with two large black spots in the angles and two dots on disk. Elytra with three equidistant oblique bands following the angle of the scutellar margin and emphasized by darkening of the reticulations and pale, tawny shading.

Holotype ♀, allotype ♂, and six paratypes taken by the writer at Sacaton, Arizona, May 6, 1931. This form is so highly ornamented that it would not ordinarily be recognized as the drab species of which it appears to be a variety.

Phlepsius (Dixianus) attractus Ball. Three years of steady collecting in Florida brought together sufficient material to establish the fact that *attractus* Ball and *floridanus* Ball were founded on extreme variations in head characters of a single variable species, which should be known as *attractus*. *P. graneticus* O. & L. from New Hampshire is another synonym of this protean form.

Phlepsius (Dixianus) nevadus Ball, n. sp.

Resembling *loculatus* and *Aligia amœna* Van D. (which belongs in this group) but larger, with broader vertex and longer elytra. Pale with a pair of spider-like marks on vertex and an elongate "saddle." Length 4.2 mm.

Vertex broadly rounding, scarcely longer on middle than against the eye; shorter than in ***loculatus;*** the margin rounding over to the front. Pronotum one-third longer than the vertex, two-thirds of its length within the curve of the eyes. Elytra long and slender. The venation and inscribed areas similar to ***loculatus.***

Color: white, inscribed with fuscous and black. Vertex with four small dots on the anterior margin, two large irregular black spots behind these as in ***stellaris,*** these spots with about five crooked radiating lines each, two pairs extending to dots on the lateral margins and another pair sometimes reaching two larger basal dashes. Pronotum irregularly inscribed omitting a broad lateral margin, the

markings arranged in irregular dots along the anterior margin. Scutellum creamy with black triangles inside the basal angles and a small orange shield on the disk. Elytra milky, the corium washed with tawny. The nervures and a series of irregularly distributed vermiculate lines fuscous. These lines in the more sparsely distributed areas mainly at right angles to the nervures. Face pale, an irregular dark band below the eyes, above this heavily inscribed; below creamy with few spots. Legs white with large black spots, below pale.

Holotype ♀ and allotype ♂, Mesquite, Nevada, October 25, 1930.

Phlepsius (Dixianus) lycioides Ball, n. sp.

Resembling *loculatus* in form, but with a broader, shorter head. Head, creamy to orange red, almost unmarked. Pronotum dark. Length 3 mm.

Vertex broader and shorter than in *condalianus*, front broader than in that species and more inclined, giving the apex of the vertex a slightly conical appearance. Elytra as in *loculatus*, venation similar with even less reticulations.

Color: pale ivory faintly inscribed, with a red head and a dark brown pronotum in sharp contrast. Vertex and face creamy with the apical portion of head orange-red, unmarked except in the darkest examples where there is a little brown on the anterior disk and a pair of lines running back to the basal dark dashes. Pronotum heavily inscribed or even washed with dark brown. Scutellum creamy, the basal angles black. Elytra ivory, sparsely but fairly uniformly inscribed with dark. Legs and below dark, the genitalia often light.

Holotype ♀, Tucson, Arizona, July 24, 1930. Allotype ♂, June 2, 1930, and twelve paratypes taken by the writer from the same location as the types from March 3-29 to September 20, 1930.

The red head and dark pronotum render this a striking little species.

Var. **mohavensis** Ball, n. var.

Size and form of *lycioides* or slightly larger. Color: female with the elytra creamy white and the black markings on pronotum reduced in width and intensity; vertex creamy, an ivory spot bearing two brown dots on apex, this spot set off by a brown semicircle; black spots on base of vertex and scutellum large. Male with traces of reticulations on elytra and the semicircle on vertex larger.

Holotype ♀, allotype ♂, and six paratypes taken by the writer on the Mojave Desert, July 1, 1931.

Phlepsius (Dixianus) condalianus Ball, n. sp.

Resembling *nevadus* but shorter and darker, with a broad white band back of the scutellum. Length 3.5 to 4 mm.

Vertex shorter and broader than in *loculatus,* slightly more angled than in *nevadus,* not as long as its basal width, rounding over to the retreating front. Front relatively broader and shorter than in *utahanus* or *nevadus,* convex in profile. Elytra shorter than in *nevadus,* about like those in *loculatus* with similar venation.

Color: dark with a broad white sub-basal band on elytra; vertex dark brown or black with a narrow ivory margin surrounding the quadrangular dark area; two dots on each lateral margin often attached to the dark area by a line, the apex bearing an ivory semicircle with two dark dots; base with two black dashes; pronotum heavily irrorate with fuscous; scutellum ivory with black spots on the basal angles; two dots on disk and two dashes at the apex; elytra heavily dotted and inscribed with fuscous, omitting a broad band back of the scutellum, and a pale area on the costal margin halfway to the apex; face creamy with an inscribed band below the eyes, a few irregular lines on the front above, and six or seven spots on the face below; legs heavily marked with dark.

Holotype ♀, allotype ♂, Tucson, Arizona, May 10, 1930, and ten paratypes from Tucson, all taken by the writer from late in March to July.

Var. **ursinus** Ball, n. var.

Size and form of *condalianus* nearly but uniformly dark without trace of the white band or costal area. The vertex is less heavily irrorate, but the white margin has almost disappeared. The face is heavily inscribed above.

Holotype ♀, Santa Catalina Mountains, Arizona, July 17, 1930. Allotype ♂ from the same place September 19, 1930, and two paratypes, Tucson, Arizona, March 22, 1931. All taken by the writer. This variety superficially resembles *utahanus,* but is much smaller with a broader, rounding head.

COMPLETE YOUR FILE

The PAN-PACIFIC ENTOMOLOGIST suggests that subscribers who have not completed their files do so at once while all the back issues are available. Price, fifty cents per copy; two dollars per volume.

A Weevil New to Oregon

Cryptorhynchus lapathi L. was introduced into New York in willow stock about 1882 and has become a serious pest on willows and poplars. It is also known as a pest of birch and alder. Since the weevil does not fly, it is distributed largely in infested nursery stock.

After the introduction into New York and New Jersey, it was reported in Ohio in 1901, Wisconsin 1903, North Dakota 1904, Maine 1907, Illinois 1908, and it is also found in Michigan. These data are from Matheson's excellent article on the species,* wherein he states that it has not been found west of the Great Plains. Additional localities recorded since 1917 are South Dakota, Nebraska and Florida, but I am unable to find any record of its occurrence farther West.

Infested specimens of willow collected near Portland, Oregon, showed damage by typical weevil larvæ, and a small series of *Cryptorhynchus lapathi* were reared out in June 1931. —W. J. Chamberlin, Oregon State College.

The Gunn Memorial Collection

Mrs. Joseph Gunn has very generously furnished a case and boxes for the proper display of the Norman R. Gunn collection of butterflies she recently presented to the California Academy of Sciences. This memorial collection will include a representative of most of the species ordinarily found along the Pacific Coast. It will be placed in the office of the department of entomology for the use of beginners in the study of our insects.

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* 1917, Matheson, R. The Poplar and Willow Borer, Cornell Univ. Ag. Exp. Sta., Bull. 388.

A NEW TELEGEUSIS FROM ARIZONA
(Coleoptera)

BY J. O. MARTIN

California Academy of Sciences, San Francisco

The genus Telegeusis was described by Dr. George H. Horn in 1895 [1] from material collected by an expedition of the California Academy of Sciences to the Cape Region of Baja California in 1894. The type of this interesting beetle still remains in the Academy's type collection, one of the survivors of the earthquake and fire of 1906. Its facies and characters incline one to place it in the Cantharidæ; but Leng in his Catalogue of the Coleoptera of America, for reasons not very clearly stated, made a monospecific family of this genus and placed it in his Lymexyloidea under the family name Telegeusidæ in association with another like family, the Micromalthidæ, the peculiar life history of which was described by H. S. Barber in the Proceedings of the Biological Society of Washington, Vol. XXVI, 1913, pp. 185-190. Nothing is known of the early stages of Telegeusis. Horn thought his genus most closely related to Drilus, which seems very unlikely.

In an arrangement of the Malthini in the collection of the California Academy of Sciences, two specimens of a Telegeusis came to light in a miscellaneous lot of the above group. These specimens, while very close to *debilis* Horn, exhibit characters which seem to indicate a new species. These two specimens and Horn's type of *debilis* show no external evidences of sex, and in a series of over forty specimens of Micromalthus there are no apparent sexual differences, so it seems unlikely that these characters are sexual.

Telegeusis nubifer Martin, n. sp.

Elongate, slender, resembling a Malthinus, soiled honey yellow, variously clouded with black, moderately clothed with cinereous depressed hairs.

Head, soiled honey yellow, sparsely but distinctly punctate, more closely at the sides behind the eyes, weakly shining, antennæ as in *debilis* but stouter and somewhat shorter, terminal joint gradually darker, the spatulate joints of palpi black. Thorax honey yellow, broadly margined on front and sides, the margin less evident behind,

1 Proc. Calif. Acad. Sci. (3), Vol. V, p. 242, 1895.

punctation less evident than that of the head, more evident on the disk and in the basal angles. Elytra, shorter than half the abdomen, reaching to posterior coxæ only, smooth and punctate at basal half, strongly rugose and finely punctate on sides and apical half, soiled honey yellow at base, growing darker to black at apex. Dorsal segments of abdomen strongly clouded with black, moderately, closely punctate. Sternum and legs, soiled honey yellow, finely closely punctate, tarsi darker; abdominal segments beneath strongly clouded with black and moderately punctate, the terminal segment lighter.

The above species differs from *debilis* Horn in the shortness of the elytra which in *debilis* extend to the base of the third abdominal segment; in having thicker and shorter antennal joints, in being more evidently punctate, and in having coarser and longer hairs, especially on the abdomen.

Two specimens are at hand, the type, No. 2467, in the collection of the California Academy of Sciences, from the San Pedro River near Fairbanks, Arizona, J. A. Kusche collector, and a paratype from Sabino Basin near Tucson, Arizona, collector not known. Both of the above are in the Van Dyke collection. The paratype is less clouded with black, but otherwise agrees with the type.

Editorial Note

The moving of the Department of Entomology to the new east wing of the California Academy of Sciences proved to be more of an undertaking than was expected, with the result that the appearance of this number of the Pan-Pacific Entomologist has been sadly delayed. Even now the department is not fully settled in its new quarters. There is shelving to be built so the books and boxes can be taken off the tables and floors, but matters have progressed so far that the ordinary work of the department can go on as usual. Local and visiting entomologists are cordially invited to make use of the facilities for study offered by the new rooms as they did of the old.

These new rooms are on the second floor of the east wing, and can be reached by stairs or the automatic passenger elevator to the left of the entrance vestibule. A fuller account of the new home of the entomological department will be included in the January number of this Journal, which it is hoped will soon follow this.—E. P. Van Duzee.

FOUR NEW NEOTROPICAL HETEROPTERA

BY E. P. VAN DUZEE
California Academy of Sciences

The four species described below have long been in manuscript in my collection or in that of the Academy. They are published now so their names can be used elsewhere.

Family Pentatomidæ

Mormidea (Melanochila) purpurescens Van Duzee, n. sp.

Allied to *montandoni* Kirkaldy, and like that species intermediate between typical Mormidea and Melanochila; deep purple-black with a conspicuous transverse pale calloused line on the pronotum. Length 8 mm.

Apex of head depressed, tylus longer than cheeks; second antennal segment slightly shorter than third. Anterior angles of pronotum tuberculate, lateral angles triangularly produced but unarmed; surface above coarsely, closely, and in part rugosely punctate.

Color deep purple-black above, pale beneath; lateral margins of the head, latero-anterior margins of pronotum, a transverse line behind the callosities that does not quite connect with the pale margins, a small spot on basal angles of scutellum and base of the costa pale and in part calloused; connexivum pale, immaculate; beneath pale testaceous-yellow; pleural areas with distinct large concolorous punctures; feet coarsely, sparsely dotted with fuscous; antennæ soiled testaceous, apex of III fuscous (apical segments wanting). Described from the unique type.

Holotype, female, No. 3600, Mus. Calif. Acad. Sci., taken at Yunges de la Paz, Bolivia, at 1000 m. This unique female has been in my collection for many years awaiting the appearance of additional material. The species, however, is so distinct it would seem perfectly safe to describe it from a single specimen.

Cholorcoris æmulus Van Duzee, n. sp.

Form and aspect entirely of *complanatus,* smaller with different male genital characters and wanting the black lining on the humeral angles and margin of the head; clear light green; legs and margins of body paler; antennæ maculate. Length 16 mm. to tip of membrane, greatest width 10 mm.

Head as in *complanatus;* sides of cheeks feebly bisinuate, their obtuse apex slightly exceeding the tylus; surface coarsely punctate and strongly rugose, these rugæ as usual omitting the base, apex,

and an interantennal band; second antennal segment a little shorter than III; latero-anterior margin of pronotum thinner than usual in this genus, the edge irregularly eroded; humeral spines terete, directed outward and a little upward; one-half as long (from base of costa) as the distance between the ocelli; pronotum and scutellum more strikingly rugose and less conspicuously punctate than in *complanatus*, the apex of the scutellum narrower. Rostrum reaching on to the third ventral segment. Venter strongly sulcate to apex of segment V. Ventral notch in male genital segment broadly open, not narrower and deep as in *complanatus*; claspers flat beyond their basal notch, their vestiture sparse and pale, bent in a long triangular subacute dorsal blade, their base next the notch produced outwardly in a short lingulate tooth; ventral extension of anal tube subacute. In *complanatus* the claspers are thick and rounded, densely clothed with long soft pale hairs, their dorsal blade narrow and acute at apex.

Color clear pale green, the margins of head and incisures of connexivum concolorous. Legs, latero-anterior margins of pronotum, base of costa and margin of abdomen tinged with fulvous; scutellar margin of clavus and ulnar nervure of corium marked with a slender red line; antennæ pale, segment I fulvous, II and III with a line on posterior face and narrow apical annulus black (V wanting).

Holotype, male, No. 3601, Mus. Calif. Acad. Sci., taken by Hno. Apolinar-Maria at Espinal, Colombia.

Arocera repleta Van Duzee, n. sp.

Above sanguineous; a spot either side at base of head, a larger one at basal angles of scutellum, a round dot on disk of corium and the membrane black. Antennæ and rostrum, except basal segment, legs, large disk of pleuræ and apex of venter black; inner genital plates and a spot at base of the outer pair also red; disk of scutellum and inner angle of corium slightly infuscated. Cheeks a little longer than tylus. Inner genital plates broader and the whole insect more oval in form than in *apta*. Described from the unique type.

Holotype, female, No. 3602, Mus. Calif. Acad. Sci., from the Panama Canal Zone, without other data.

Family Nabidæ

Pagasa luctuosa Van Duzee, n. sp.

Near *œnescens* Stål and running to that species in Reuter's key of 1909; differs in having the head entirely piceous and the coxæ and legs uniformly yellow. Length 7 mm.

Head as long as anterior lobe of pronotum; segment II of antennæ twice the length of I and the supplementary segment together, II, III, and IV subequal; rostrum surpassing anterior coxæ, segment II a little longer than III, attaining base of anterior coxæ,

III very short, about equaling median thickness of anterior coxæ. Pronotum a little wider across the base than long; hind margin broadly emarginate. Head and pronotum with a few scattering long erect setæ. Apical half of anterior tibiæ expanded, basal half concavely arcuate behind, and armed with short close-set black spinules as is the apical one-half of the inner edge of the anterior femora. Veins of clavus and radial vein of corium with a row of close-set punctures bearing a few minute pale hairs; costa as far as the transverse plica smooth and polished for a space as wide as the width of the scutellar areole of the clavus; germinate discal punctures of the scutellum deep. Beneath sparsely pale setose.

Holotype, female, No. 3603, Mus. Calif. Acad. Sci., collected by Mr. Bruce Martin, June 2, 1916, at Amaya Cispata Bay, Colombia. Paratype, one female, same data.

This species differs from *ænescens* principally in the black head, the pale coxæ, and in having the apical half only of the anterior femora spinulose beneath.

Entomology for the Householder

It is not only the farmer who is interested in combating injurious insects. Everyone who has a flower garden or a vegetable patch back of his home finds sooner or later that there are insect depredations to be overcome. It is for the help of such that Professor Doane has prepared his little book on "Common Pests."[1] This book is of convenient size, is beautifully printed on excellent paper, and the 215 illustrations are unusually good. Altogether it is a most suitable book for household use. It treats of pests other than insects, such as spiders and snails, and even mammals and birds. One might well feel resentful to find among the latter our old friend the bobolink classed as a "pest." In western New York its song meant that summer had come, and perhaps no bird note was more welcome unless it might be the song of the robin and bluebird in March. It certainly was entitled to what little rice it needed while tarrying in the South. However, most of the pests treated of are insects, and here we are told how to recognize them and how to control them. Both eastern and western forms are included, and the book should appeal to all interested in the out-of-doors.—E. P. Van Duzee.

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1 Common Pests, by Rennie D. Doane, in the series of Nature Books published by Charles C. Thomas, 8vo., 384 pages, Springfield, Illinois, 1931.

AN UNDESCRIBED TINGITID FROM BORNEO AND STRAITS SETTLEMENT

(Hemiptera)

BY CARL J. DRAKE
Ames, Iowa

Phyllontocheila admiranda, Drake, n. sp.

Allied to *P. erosa* Fieber, but differing from it in having the entire costal area greatly clouded with brown or fuscous and without transverse fasciæ; it is also much larger.

Pronotum coarsely pitted, moderately swollen, dark castaneous or blackish, the triangular process reticulate and brownish; lateral carinæ very distinct, diverging posteriorly, the median carina becoming indistinct posteriorly. Hood large, somewhat globose, a little longer than high. Paranota extremely large, greatly clouded with brown or fuscous. Head blackish, armed with five long, stout, blunt spines. Antenniferous tubercles very long, spine-like, projecting beyond the middle of the first antennal segment. Antennæ moderately long, dark reddish brown; segment I considerably thicker and nearly two and a half times the length of the second; III slightly more than twice the length of the fourth.

Elytra very broad, widest at the apex; dark brown or fuscous, a few of the cells lighter and semi-transparent; subcostal area very narrow, composed of a single row of areolæ; discoidal area broad, very long, extending beyond the middle of the elytra, composed of several rows of areolæ; subcostal area very broad, widest at the apex, the areolæ moderately large and not arranged in definite rows. Legs dark reddish brown. Rostrum long, reaching about to the posterior margin of first venter.

Length 8.04.; width 5.4 mm.

Type, Borneo, in National Natural History Museum, Paris, France; also *paratype,* Malacca, Straits Settlement, collection of G. Fallou. Paratype, Borneo (G. Fallou), in collection of author.